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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/686,216
Filing Date: October 15, 2003
Appellant(s): HAMANN ET AL.

Kin-Wah Tong
For Appellant

EXAMINER'S ANSWER

This is a corrected copy of the Answer responding to the appeal brief filed November 10, 2006 appealing from the Office action mailed June 9, 2006. The only substantive changes have been to section 1 “Real Party in Interest,” which was previously missing.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board’s decision in the pending appeal: Co-pending application number 11/122,152 is a continuation-in-part of the instant application and also currently under appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

U.S. Pat. Pre-grant Pub. No. 2002/0146196	Shirane et al.	10-2002
U.S. Pat. No. 6,522,448	Baba et al.	2-2003
U.S. Pat. No. 6,845,198	Montgomery et al.	1-2005
U.S. Pat. App. No. 10/755,816	Hamann et al.	1-2004
U.S. Pat. App. No. 11/122,152	Hamann et al.	5-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102 / § 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Claims 1 and 21 are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Shirane et al. (2002/0146196). Shirane et al. (2002/0146196), hereinafter referred to as Shirane, teaches a method and apparatus for applying electrical control to a photonic crystal structure comprising a photonic crystal (e.g. of gallium arsenide) – situated on a substrate (e.g. 70) – having a region of relatively high index of refraction wherein light is confined/guided (e.g.72, 77). There is a plurality of apertures (e.g. see fig. 11 and 12) formed through the substrate that are filled with a lower refractive index material. Electrical control of the device is provided by two lateral electrical contacts (80 and 81) coupled to the photonic crystal, wherein both contacts are optically isolated from the waveguide (e.g. 77) by the plurality of apertures. The electrical contacts may be made of metal alloy and doped to form "n" and "p" type regions and may be formed by depositing a metal electrode material on the doped semiconductor layer. (See e.g. paragraphs 64-77 and Figs. 11 and 12)

The applicability 35 U.S.C. § 102 or 103 depends on the interpretation of the claim's recitation of "at least one electrical contact positioned to provide electrical control along substantially **an** entire length of said layer." (emphasis added) The electrodes of Shirane (e.g. 80 or 81) are taught to provide electrical control along **an** entire length – i.e. the entire length of the electrodes – of the waveguide (e.g. 77) layer. (See e.g. Fig. 12) Hence, a 35 U.S.C. §102 rejection would be appropriate. However, in the alternative if the claim is interpreted as necessitating the electrodes to extend along the entire waveguide in the claimed device, then a 35 USC 103 rejection would be appropriate.

Shirane does not explicitly recite that the electrodes (e.g. 80 and 81) are positioned substantially along the entire length of the waveguide layer (e.g. 77). Shirane teaches that the electrodes (e.g. 80 and 81) provide electrical control in the waveguide (e.g. 77). When a voltage is applied to the electrodes the structure of the device changes and light can no longer propagate through the waveguide. While Shirane teaches that the electrodes are arranged to provide electrical control over a substantial amount (perhaps a majority) of the waveguide layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to extend at least one electrode to cover the entire length of the waveguide in the invention of Shirane because this would allow a larger region of the waveguide to be switched on/off. One would have been motivated to do so because Shirane teaches that the switch may be turned on/off via the control of the electrodes (see e.g. paragraph 72), following the ability to control a larger region of the waveguide would provide greater assurance that light will not pass through the waveguide when the switch is turned off.

Claims 1-15, 21-31 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirane et al. (2002/0146196). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide various doping configurations and/or dope the first and second electrical contacts identically because this would allow an even current injection method. One of ordinary skill would have been motivated to do so because it would yield an efficient control device.

Claims 16-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirane et al. (2002/0146196) in view of Baba et al. (6,522,448). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that the apparatus may be used in an optical dely line, a switch, or a photodetector.

Since these are all commonly used optical devices – e.g. as shown by Baba et al. (6,522,448) – and the invention of Shirane may be employed as a general semiconductor device, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the device of Shirane in such optical devices because the device of Sugitatsu will provide an efficient means for control of an optical device.

Claims 32-36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirane et al. (2002/0146196) in view of Montgomery et al. (6,845,198). Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above.

However, Shirane does not explicitly teach that the electrical contacts are used to control the waveguide properties via thermo-optic effects, or the specific steps of forming the electrodes with a silicide contact layer over the dopant layer.

As silicide layers over dopant layers are well known for providing electrical contacts in electro-optic devices – as taught i.e. by Montgomery (See e.g. Col. 4, ll. 1-20) – it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a silicide layer over the dopant layer in the electrodes of Shirane because this would allow an efficient electrode contact.

Shirane teaches a method and apparatus for applying electrical control to a photonic crystal as discussed above. Wherein it is taught, as is commonly known, that applying a current to the electrodes (8n and 8p) will heat up the device – thus the substrate will be heated as current is applied to the electrodes and cooled as the current is reduced. The phrasing in the preamble of claim 32 of "thermo-optic control" is not given significant patentable weight because it does not necessary breath life into the claim. (See e.g. paragraphs 64-77 and Figs. 11 and 12)

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 10/755,816. Although the conflicting claims are not identical, they are not patentably distinct from each other because generally, the removal of limitations is within the general skill in the art. While the 816' application teaches at least one electrode, it does not explicitly teach a plurality of electrical contact pairs in a single layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a second electrode in the same layer the invention of the 816' application because this would allow an electrical field to be efficiently created between the electrodes.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 1-36 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 11/122,152. Although the conflicting claims are not identical, they are not patentably distinct from each other because generally the removal of limitations is within the ordinary skill in the art. While the 152' application does not explicitly recite that the electrical contact pairs "control along substantially **an** entire length of said layer" (emphasis added) the same anticipation and/or obviousness argument presented in section 2 above applies here.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

(10) Response to Argument

The issue on appeal is the construction of the claim limitation "an entire length." Applicant argues that Shirane does not teach "at least one electrical contact positioned to provide electrical control along substantially **an entire length** of [said waveguide] layer." (emphasis added) Following, Applicant argues that this limitation is found in each independent claim, thereby placing the application in condition for allowance.

This is not persuasive because Shirane teaches at least one electrical contact (e.g. 80 or 81), which is capable of providing electrical control along, at least, the entire length of the waveguide layer where the electrode is placed. (See Fig. 12.) The Examiner asserts that the recitation of "an entire length", when given its broadest reasonably interpretation, is construed as "the entire length of **any** specific subsection." Thus, Shirane anticipates this limitation.

Applicant acknowledges this difference in claim construction on pages 4 and 5 of the Appeal Brief. The recitation of "an entire length" is underlined in independent claims 1 and 21 reproduced on the bottom of page 4 and top of page 5, respectively. Following, Applicant argues that the difference between Shirane and the instant invention is that "Shirane provides only regional electrical control of the waveguide" (emphasis in original) (p. 5, ¶2, l. 1), whereas the instant invention "provides superior electrical control of a … waveguide by … electrical contacts along substantially the entire length of the waveguide." (emphasis in original) (p. 5, ¶2, l. 5-7.) It appears, respectfully, that applicant is arguing for allowance based on the narrow limitation of "the entire length of the waveguide", which is—as applicant highlights—not recited in the claims.

Applicant furthers this argument by asserting that "the claim could alternatively have been worded to recite a contact that extends 'along substantially the entire length of said layer'; however, the current wording was chosen to avoid potential confusion due to antecedent basis issues." (emphasis in original) (p. 6, ¶2, l. 8-10.) This argument is unpersuasive because Applicant has the opportunity during prosecution to amend the claims to render them clear and unambiguous. Applicant chose not to do so even after the Examiner raised this issue during prosecution. Applicant had the opportunity to set forth the exact claims they desired prior to appeal.

Alternatively, if this claim recitation is construed (in the Examiner's opinion incorrectly) as requiring electrical control along "**the entire** length of the waveguide layer"; the claim recitation is an obvious variant of Shirane. As discussed on page 5 above; it would have been obvious to one of ordinary skill in the art at the time of the invention to extend at least one electrode to cover the entire length of the waveguide in the invention of Shirane because this would allow a larger region of the waveguide to be switched on/off. One would have been motivated to do so because Shirane teaches that the switch may be turned on/off via the control of the electrodes (see e.g. paragraph 72), following the ability to control a larger region of the waveguide would provide greater assurance that light will not pass through the waveguide when the switch is turned off.

Applicant's argues that paragraph 72 of Shirane does not provide motivation for such a combination because it does not explicitly state that the electrodes should be extended along the entire waveguide. This is unpersuasive because if Shirane taught that explicitly, it would anticipate placing the electrodes along the entire length of the waveguide, rather than rendering it obvious.

Terminal disclaimers over applications 10/755,816 and 11/122,152 were filed on October 20, 2006. Theses were filed after the close of prosecution and before Applicant's Appeal Brief.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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